

Simulation Scenario

Simulation Case Title: Medication Errors

Patient Name: No patient

Patient Age: NA

Chief Complaint: NA

<p>Brief narrative description of case <i>Include the presenting patient chief complaint and overall learner goals for this case</i></p>	<p>There is no scenario associated with this station. It will be hands on learning on how to draw correct dosages for pediatric medication.</p>
<p>Primary Learning Objectives <i>What should the learner gain in terms of knowledge and skill from this case?</i></p>	<p>Correct dose calculation and drawing of medication for pediatric patients.</p>
<p>Critical Actions <i>List which steps the participants should take to successfully manage the simulated patient. These should be listed as concrete actions that are distinct from the overall learning objectives of the case</i></p>	<p>Being able to accurately dose pediatric medications to include: Epi – cardiac, anaphylaxis, push dose Narcan Midazolam Lorazepam Amiodarone Solumedrol Magnesium Sulfate TXA</p>
<p>Learner Preparation <i>What information should the learners be given prior to initiation of the case</i></p>	<p>Tips and tricks on how to obtain pediatric doses prior to arrival on scene. Utilizing PCH cards and technology to ensure dosages are correct.</p>

Initial Presentation

Initial vital signs	HR	B/P	RR	O2sat	Temp	BGL
<p>Overall appearance <i>What do learners see when they first enter the room?</i></p>						
<p>HPI <i>Specify what info here and below must be asked vs what is volunteered by patient or caregiver</i></p>						
<p>Past Medical/Surgical History</p>	Medications		Allergies		Family History	

Physical Examination

<p>General</p>	
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I. Introduction (5 minutes)

- Importance of safe medication administration in pediatric emergencies
- Overview of the session objectives tailored for paramedics, nurses, and EMTs

II. Pediatric Pharmacokinetics and Pharmacodynamics (5 minutes)

- Differences in absorption, distribution, metabolism, and excretion in children

1. Absorption:

- Gastric pH in neonates and infants is higher (more alkaline) than in adults, affecting the solubility and absorption of certain medications.
- Gastric emptying time is slower in infants, which can delay the onset of medication effects.
- Skin permeability is greater in infants, leading to increased absorption of topical medications.

2. Distribution:

- Body composition differs: infants have a higher percentage of total body water and lower body fat compared to adults, affecting the volume of distribution for hydrophilic and lipophilic drugs.
- Protein binding is lower in neonates, meaning that more free drug is available, which can enhance drug effects and toxicity risk.

3. Metabolism:

- Liver enzyme activity is immature in neonates, leading to slower metabolism of drugs; this gradually matures in the first year of life.
- Phase I and Phase II metabolic pathways develop at different rates, affecting the clearance of various medications.

4. Excretion:

- Renal function is immature in neonates, resulting in decreased renal clearance; this can lead to prolonged drug effects and toxicity.
- Glomerular filtration rate (GFR) increases in the first few weeks of life and continues to mature throughout childhood, impacting drug dosing.

- Age-specific considerations in drug dosing relevant to pre-hospital and emergency settings

1. Weight-Based Dosing:

- Pediatric dosing is often calculated based on weight (mg/kg), which is essential in emergency settings to ensure safety and efficacy.
- Accurate weight measurement is critical; when not available, use age-based estimations (e.g., the "Pediatric Rule" or the "Brothers Rule").

2. Developmental Differences:

- Neonates and infants may require different dosing intervals due to immature organ function, impacting absorption, metabolism, and excretion.
- As children age, their metabolic rates change, often requiring adjustments in dosing frequency and amounts.

3. Age-Specific Formulations:

- Medications may be available in different formulations (liquid, chewable, etc.) that are more appropriate for specific age groups.
- Consideration must be given to the child's ability to swallow tablets or capsules, especially in emergencies.

4. Emergency Situations:

- Rapid assessment is crucial; providers must quickly determine the appropriate medication and dosing based on age, size, and condition.
- Familiarity with age-specific emergency protocols (e.g., for resuscitation) is essential to minimize errors in high-stress situations.

III. Common Medication Forms and Routes (5 minutes)

- Oral, topical, inhalation, and injectable medications
- Practical insights on when and how to use each route in emergency care

IV. Hands-On Portion: Pulling and Delivering Medications (20 minutes)

- Demonstration (5 minutes): Proper techniques for pulling and delivering emergency medications using syringes and auto-injectors.
- Practice (15 minutes): Participants practice pulling accurate doses of mock medications and simulate delivery techniques on manikins or with peer role-play, focusing on speed and accuracy in emergency scenarios.

V. Calculating Pediatric Doses (5 minutes)

- Weight-based dosing and quick calculation methods

1. Basic Weight-Based Dosing Formula:

- Formula: $\text{Dose (mg)} = \text{Weight (kg)} \times \text{Dose per kg (mg/kg)}$
- Example: If a child weighs 10 kg and the medication dose is 5 mg/kg, the total dose would be $10 \text{ kg} \times 5 \text{ mg/kg} = 50 \text{ mg}$.

2. Using Age-Based Weight Estimation:

- For quick estimations, you can use formulas based on age:
 - For children aged 1 to 12 years:
 - $\text{Weight (kg)} = (\text{Age in years} + 4) \times 2$ (American Academy of Pediatrics (AAP))
 - Example: A 6-year-old would be estimated to weigh $(6 + 4) \times 2 = 20 \text{ kg}$.

3. The "Rule of Thumb" for Dosing:

- A common rule for emergency medication is to use the following:
 - For infants: 10-15 mg/kg for analgesics/antipyretics (e.g., acetaminophen).
 - For children: 5-10 mg/kg per dose for similar medications.

4. Calculating Doses Quickly in Emergencies:

- Use a Pediatric Dose Chart that outlines common medications and their weight-based dosing ranges for quick reference.
- Alternatively, use smartphone apps or dosing calculators specifically designed for pediatric patients to avoid calculation errors.
- Use of age and body surface area (BSA) in calculations with specific examples relevant to emergency situations

VI. Monitoring and Managing Side Effects (5 minutes)

- Common side effects in pediatric patients during emergency care

1. Gastrointestinal Distress:

- Common side effects include nausea, vomiting, and diarrhea, especially with medications like antibiotics or analgesics.

2. Sedation or Drowsiness:

- Medications such as antihistamines or opioids can cause increased sedation, which may be concerning in emergency settings where alertness is crucial.

3. Respiratory Issues:

- Some medications may lead to respiratory depression or bronchospasm, particularly in asthmatic patients receiving certain bronchodilators or sedatives.

4. Allergic Reactions:

- Pediatric patients can have unpredictable allergic reactions, including rashes, urticaria, or anaphylaxis, particularly with antibiotics and vaccines.

5. Cardiovascular Effects:

- Medications may cause changes in heart rate or blood pressure, such as tachycardia with certain stimulants or hypotension with sedatives.

- Importance of monitoring and responding to adverse reactions in a pre-hospital setting

VII. Conclusion and Q&A (5 minutes)

- Recap of key points

- Open floor for questions and clarification specifically for paramedic, nurse, and EMT roles